ISLANDS AT THE PERIPHERY: INTEGRATING THE CHALLENGES OF ISLAND SUSTAINABILITY INTO EUROPEAN POLICY

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Abstract[1]

Sustainable development is a fundamental objective of the European Union and the global community. The considerable sustainability challenges faced by small islands are recognised at UN level, however the sustainability challenges faced by EU islands are not well reflected in EU policy, where the approach to island issues has been incremental and fragmented. After identifying EU islands and their main sustainability issues, this paper argues for a stronger awareness of islands issues in EU policy processes. It notes in particular three issues that needed to be addressed before this is done. These relate to the current restrictive definition of islands, which excludes island states, and the fact that the island issues of peripherality and insularity do not fit into any of the categories provided in the EU's impact assessment guidelines, a key tool for internalizing sustainability concerns in EU policy. Third, since European islands are found at various administrative scales, there is a lack of harmonized statistical data on fundamental factors necessary for monitoring sustainable development in EU insular regions. The role of Malta in highlighting challenges and concerns faced by European islands is also explored, *vis a vis* the European Union policy-making and policy-designing mechanisms.

1. Introduction

Sustainable development (SD) is a fundamental objective of the European Union, as elaborated in the renewed EU Sustainable Development Strategy (CEC, 2001). At a global level the commitment to sustainable development is enshrined in the Rio and the Johannesburg (UN, 2002) processes. Within the Johannesburg process, islands have been identified as a 'special case both for environment and development … that are increasingly constrained by the interplay of adverse factors' (UN, 2003). However the sustainability challenges faced by EU islands are not well reflected in EU policy, which has tended to be incremental as various types of islands became incorporated within the community, and fragmented by sector, with island policy featuring mostly in cohesion, agriculture and fisheries policy. This is despite the recognition that these regions face particular challenges due to their isolation and generally small size (Eurisle, 2002; Planistat, 2002; CEC, 1994), which demand particular attention when operationalising sustainable development. This is even more relevant five years after two small island states, Cyprus and Malta, joined the EU in 2004.

In order to investigate these concerns, this paper first reviews the EU and international policy framework for island sustainability. It then identifies the location of EU islands based on a spatial dataset, and elaborates a set of European island sustainability issues that are identified through expert interviews. Since one of the principal tools for institutionalising SD thinking within EU policy process is the practice of impact assessment, the sustainability issues were then compared with the impact issues identified in the EU Impact Assessment Guidelines (CEC, 2005)[2]. In order to assess the dimensions of European island sustainability issues, these are then associated with a set of indicators, which are quantified and reviewed. The paper closes by identifying a number of issues that need to be addressed if EU policy is to reflect a stronger awareness of island sustainability issues within EU policy processes. The role played by Malta in raising island issues within the complex EU policy-making mechanisms is also highlighted

[1] This research was carried out within the framework of the European FP6 project SENSOR, on science-based ex-ante Sustainability Impact Assessment Tools (SIAT) to support decision making on policies related to multifunctional land use in European regions ('Sustainability Impact Assessment: Tools for Environmental, Social and Economic Effects of Multifunctional Land Use in European Regions' (SENSOR), Contract Number 003874).
[2] http://ec.europa.eu/governance/impact/docs/SEC2005_791_IA_guidelines_main.pdf.

This research was carried out as part of the European FP6 funded project SENSOR[3], which develops science based *ex-ante* Sustainability Impact Assessment Tools (SIAT) to support decision-making on policies related to multifunctional land use, in European regions. Within this project, a specific research interest was the impact of EU policies on sustainable land use in four types of sensitive regions: mountains, coastal areas, islands and post-industrial areas. This present research reports and builds upon the survey of European islands carried out within the SENSOR research project.

2. Island Policy Context

The sustainable development challenges of island regions has a high political profile at international level, where sessions of annual meeting of the UN Commission for Sustainable Development are dedicated to this issue. This high profile was cemented at in the Global Conference on the Sustainable Development of Small Island Development States (SIDS) in April 1994, which resulted in the Barbados Programme of Action (UN, 2004).[4] This Programme of Action set forth specific actions and measures to be taken at the national, regional and international levels in support of the sustainable development of SIDS. In 2002, the World Summit on Sustainable Development (WSSD) confirmed the special case of SIDS and in the 2004 high-level international meeting of Mauritius, the Barbados Programme of Action, the full implementation of Agenda 21 and the outcomes of other relevant major United Nations conferences and summits, including the Monterrey Consensus and the Millennium Development Goals, were reaffirmed as central in achieving effective sustainable development for SIDS.

Many authors have discussed the problem of insularity and ultra-peripherality (Musotto, 2007; Arnell, 2005; Briguglio, 1995; Cordina and Farrugia, 2005, Metz, 2001; Wells, 1996;), highlighting the vulnerability of islands compared to mainlands (Cordina and Farrugia, 2005)[5]. In view of the perceived structural and institutional weaknesses of small island states, and the fact that traditional economic indicators such as GDP are unable to capture these weaknesses, the UN has supported the development of an Economic Vulnerability Index.[6] This is 'a measurement of the lack of economic resilience arising from the relative inability of a small island state to shelter itself from forces outside its control' (Briguglio, 1993: pp 1-2), despite relative economic prosperity relative to other 'developing' countries. The index is a composite of three variables: exposure to external economic conditions; insularity and remoteness; and proneness to natural disasters.

EU Islands Policy

The EU has made special provisions for islands in its Treaty and a number of policies. Before reviewing these provisions, it is important to note that the EU generally distinguishes between three categories of islands: 1) islands that are whole or part of 'overseas countries and territories' (such as Greenland, French Polynesia and Bermuda); 2) the group of: the French overseas departments, the Azores, Madeira and the Canary Islands, often termed 'most remote regions', which it considers an inherent part of the EU, the distinctive characteristics of which qualify them for specific treatment in various sectors such as transport and cohesion policy under the Treaty of Amsterdam; and 3) continental EU islands, which are recognised under various sectoral polices such as agriculture and fisheries to be in need of special consideration.

With respect to the first category of islands, in its Part Four, the Treaty of Amsterdam specifically focused on the association with the Community of the non-European countries and territories that have special relations

[3] Sustainability Impact Assessment: Tools for Environmental, Social and Economic Effects of Multifunctional Land Use in European Regions. Contract nr. 003874-2 within the Sixth Framework Programme, Priority 1.1.6.3 - Global Change and Ecosystems.

[4] http://www.un.org/documents/ga/conf167/aconf167-9.htm.

[5] This paper assesses "the importance of the stability of partner countries and of price volatility as important determinants in the way in which such variables impact on vulnerability. Subject to the usual measurement problems, the index proposed here generally confirms that small states, particularly if insular, tend to face heightened degrees of vulnerability".

[6] The Barbados Programme of Action was endorsed by the General Assembly of the United Nations in its resolution 49/122 of December 1994, where Paragraphs 113 and 114 called for the development for a vulnerability index for SIDS.

with Denmark, France, the Netherlands and the United Kingdom, as listed in Annex II to the Treaty. The purpose of association is described as promoting 'the economic and social development of the countries and territories … to further the interests and prosperity of the inhabitants of these countries and territories in order to lead them to the economic, social and cultural development to which they aspire' (Article 182).

With respect to the second category of islands, the Treaty of Amsterdam made special reference to Europe's 'most remote regions' - the French Overseas Departments of Guadeloupe, French Guiana, Martinique and Réunion, and to the Atlantic archipelagos of the Canaries, the Azores and Madeira. The special circumstances of these most remote regions are taken into account in Article 299 '[h]owever, taking account of the *structural social and economic situation of the French overseas departments, the Azores, Madeira and the Canary Islands*, which is compounded by *their remoteness, insularity, small size, difficult topography and climate, economic dependence on a few products*, the permanence and combination of which *severely restrain their development*, the Council, acting by a qualified majority on a proposal from the Commission and after consulting the European Parliament, shall adopt specific measures aimed, in particular, at laying down the conditions of application of the present Treaty to those regions, including common policies' (emphasis added).

With regard to the third category of islands - continental EU islands - relevant EU island policy is fragmented, and relates primarily to its cohesion, and agriculture and fisheries policies. EU cohesion policy makes special reference to islands and other regions with 'handicaps'. The preamble to Regulation 1080/2006, which lays out the rules for application of the European Regional Development Fund, indicates that this fund 'contributes to reducing the gap between the levels of development of the various regions and the extent to which the least favoured regions, including rural and urban areas, *declining industrial regions, areas with a geographical or natural handicap, such as islands, mountainous areas, sparsely populated areas and border regions, are lagging behind*'(emphasis added).

EU Regulation 1698/2005, which supports rural development through the European Agricultural Fund for Rural Development (EAFRD), indicates that special provisions should apply 'to mitigate the specific constraints and structural problems in farming and forestry activities and in adding value to agricultural and forestry products *as a result of remoteness, insularity or distant location and of the dependency of the rural economy on a limited number of agricultural products*, and to promote a robust rural development policy' (Article 60) (emphasis added). In terms of fisheries policy, the Council Regulation 1198/2006 on the European Fisheries Fund[7] provides higher ceilings for outermost regions and outer Greek islands, which are described as '*under a handicap due to distant location'* (emphasis added).

At the same time, all three categories of islands are also addressed by a number of general provisions in the European Treaty. The Treaty of Maastricht (Article 154 on Trans-European Networks) and the Treaty of Amsterdam (Article 158 on cohesion policy) addressed islands in this way. Article 154 of the Treaty notes that the EU 'shall take account in particular of the need to link island, landlocked and peripheral regions with the central regions of the Community' while Article 158 refers directly to the necessity to reduce the '*backwardness of the least favoured regions*,' which includes islands.

This study focuses on the second and third category of EU islands, and does not consider the European overseas countries and territories that are far removed from the European continent such as the French, Dutch and British overseas territories, since their bio-geographical situation and thus sustainable development issues differ considerably from the islands within the European continent.

Island Research

European islands have attracted attention as areas of 'backwardness' (as noted in Article 158 of the European Treaty) within the EU policy community for a number of reasons, as also highlighted in the 2002 Eurisles publication *Off the coasts of Europe*, supported by the Conference of Peripheral and Maritime Regions. This research reported that although islands are diverse from one another they share specific social, economic and environmental problems. These common issues represent various structural constraints that result in multiple consequences, such as a below average Gross Domestic Product (GDP) per capita and higher cost of living

[7] EC, 1198/2006 of 27 July 2006.

due to insularity. Small size of markets and weaker competition result in lower wages and reflect the lower living standards present on islands. The exceptional environment of islands is often threatened by the seasonality of the tourism industry and the vulnerability to climatic and seismic events, apart from their being more exposed to environmental disasters. These vulnerabilities are compounded by other difficulties such as the fragmentation of territories due to mountains and poor accessibility. The study also enters into the effectiveness or otherwise of EU polices with respect to islands and the impact of certain policies on European islands. Various studies show that EU state and regional aid and agricultural and fisheries assistance do not always favour islands because island dimensions are not always taken into consideration when it comes to planning or designing polices. Another element of concern is represented by the liberalisation of transport services, particularly during the 1990s, which resulted in difficulties for island transportation networks.

The DG Regio-funded Planistat (2002) study on EU15 continental islands, as well as the Spanish African territories of Ceuta and Mellila, focuses on measures and policies undertaken by the EU and Member States to remedy any backwardness caused by being an island. Drawing on reports on island issues prepared by the European Parliament (EP, 1998), the Economic and Social Council, ECOSOC (2000), and the Committee of the Regions (CoR, 2002) the study identified 15 island problems that characterise 'backwardness'. These include: isolation from the mainland, higher costs of sea and air transport, communications and infrastructure, restricted usable land area, limited fisheries resource, restricted water supplies, restricted sources of energy, marine and coastal pollution, difficulties in waste management, decreasing population, coastal erosion, the shortage of a qualified workforce, absence of a favourable economic climate for business, difficulties in access to health and education services, small size of local market, and poor economic diversification. The Planistat study concludes that EU policies can have impacts on islands in one of the following five ways: 1) by directly aiming at alleviating the problems of islands (cohesion and transport policies); 2) by applying across the whole EU with some limited territorial element (agriculture and fisheries, environment and cohesion fund); 3) by applying across the whole EU with little territorial element (competition and state aid); 4) by applying across the EU with no island priority but benefiting the islands (energy, research, information society, and public health); and, 5) within emerging areas of EU policy that may potentially assist the islands (employment - growing local dimension).

Despite the special attention afforded to island concerns in the European Treaty and in cohesion, agriculture and fisheries policy, the European approach to islands may be characterised as incremental rather than comprehensive, and fragmented across a number of policy areas. There is also the problem of definition, where the Eurostat (1994) working definition is now being used as a de facto definition of European island status when drawing up impact assessments, thereby excluding island states from being considered islands when the impacts of new policy proposals are being assessed (EC, SEC(2006) 1684). It describes islands in terms of those geographical entities that are islands but *do not host national capitals* and *are not linked to the mainland by a bridge.* One positive development in this direction was the agreement achieved during the Intergovernmental Conference convening during the European Council of June 2007 (Conference of the Representatives of the Governments of the Member States, 2007) to clarify, in recognition of the specific challenges facing Islands within the European territory, that the reference to island regions made in article III-220 of the Draft Constitutional Treaty (IGC, 2004) also refers to Island States.

After having reviewed some of the conceptual issues related to the sustainable development of European islands, the methodology used in this research is described in the next part. Subsequently the findings of the research are presented and discussed also in the light of the selected sustainable development indicators identified for European islands. The conclusions summarise the research's major findings and outline directions for future research.

3. Methodology

The methodology used in this paper follows the SENSOR protocol established to carry out surveys in the four SENSOR sensitive regions, namely: coastal, post-industrial, mountainous and islands.

Geographical Identification

A geographical identification of European (EU 25+3) islands based on a GIS operation[8] that removed the European mainland, leaving only islands and island regions[9] identified the base set of islands for consideration. Where it was known that islands are connected to the mainland with a bridge, these islands were removed from the dataset[10]. The source of information about islands connected to their mainland with a bridge is the extensive 'Portrait of the Islands' study published in 1994 by Eurostat, which however only covers EU12. Furthermore, it was considered that islands far removed from the European continent such as the French, Dutch and British overseas territories would not be covered in the study due to the fact that their bio-geographical characteristics differ considerably from the islands within the European continent. This criterion also excludes Greenland.

Interviews on Sustainability Issues

A research into literature found to be lacking firm conclusions with respect to sustainability issues in European Islands. The following assessment of secondary sources therefore indicated that primary data on sustainability issues would have to be gathered. This was done by interviewing sustainability experts in a set of 28 representative study islands. This was conducted via telephone interviews with experts identified through the literature and various specialised networks[11]. Experts were identified on the basis of their knowledge in the field of sustainability issues and/or expertise in relation to the islands that were the subject of the interview.

Identification of Islands Study

The 1994 'Portrait of the Islands' study (CEC, 1994) identified a set of approximately 450 inhabited European islands that included all European islands that are not a host to a national capital and not linked to the mainland by a bridge. However since this study was restricted to EU12, islands from the remaining 15 members states that joined after 1994 were considered. The island states of Malta and Cyprus were also included, since these small island states experience island sustainability issues to an even higher degree than other islands due to lack of support, particularly of an economic nature, from a 'mainland'. However, island states such as Ireland and the UK, which are not considered as small island states at UN level (Hein, 2004) were not included in this survey as island states, although their islands were considered. Building on the above considerations, a set of study islands for detailed investigation was drawn up on the basis of the following criteria:

For each of the EU 25+3 countries that have islands, at least one major island or island group was included; the major (in terms of population and size, and political importance such as a high degree of political autonomy) European islands or island groups were included (e.g. Sicily and the Aland Islands); a selection of both large islands and archipelagos were included (e.g. the Sardinia and Crete and the Balearic and the Aegean); islands from both northern and southern Europe were included, as well as those in the Atlantic, in order to ensure a balanced geographical distribution; islands that are both close to the mainland (such as the Tuscan archipelago), as well as ones far from the mainland (such as the Shetland Islands and Pantelleria). Table 1 below summarises the selection made.

[8] The basis of this calculation is the EuroGeographic NUTS0 data layer, which is the standard base map of the Sensor project. Due to the specific use for which EuroGeographic created this aggregated base map, certain smaller islands are not included in the estimates.

[9] A small number of inland islands within lakes were generated as slivers through polygon combination error, and were manually cleaned from the dataset as far as this was possible.

[10] As in the case of the many Danish islands that lie close to the mainland.

[11] Networks such as the United Nations partnerships SUSTIS, the (European) Islands Commission, the Global Islands Network, and Eurisles.

Table 1: Selection of 28 Study Islands

No	Country	Islands	Rationale for selection
1	Cyprus	Cyprus	Small island state.
2	Denmark	Bornholm	Bornholm largest island with approximately 45,000 people and an area of 580km^2. The Faroe Islands, also Danish, have not been selected due to the presence of three other North Sea archipelagos in selection. Greenland not included since not within the European continental area.
3	Estonia	Saaremaa	The two principal Estonian Islands are Saaremaa and Hiiumaa. Of these the larger island, Saaremaa, which has an area of 2,922 km^2 as opposed to Hiiuma's 1,023km^2, has been included in the study.
4	Finland	Aland	Finnish Islands are made up of the Finnish Islands archipelago and the Aland Islands, both of which are included in the set of islands for the survey.
5		Finnish Islands Archipelago	
6	France	Corsica	French continental islands consist of Corsica, the smallest of the French regions, (8,681km^2) and various small coastal islands on the Atlantic and southern coasts.French overseas island territories are not included since they are not part of the European continent.
7	Germany	East Frisian Islands	The German islands are situated in the North Sea and the Baltic Sea. Of the three archipelagos of the East Frisian Islands, the islands of Schleswig-Holstein and those of Mecklenburg-Vorpommern, the East Frisian Islands have been included here.
8	Greece	Crete	The largest island in Greece is Crete, with an area of 8,336km^2 and a population of approximately 550,000. Greece also contains the archipelagos of the Ionian, the Northern and Southern Aegean, and about 40 small and medium-sized inhabited islets and islands scattered around the Greek mainland. Crete and the three archipelagos of the Ionian, the Northern Aegean and the Southern Aegean were selected.
9		Ionian	
10		Northern Aegean	
11		Southern Aegean	
12	Iceland	Iceland	The island state of Iceland was selected.
13	Ireland	Irish Islands	Of Ireland's 365 islands, most of which are off the west coast of Ireland, some 53 are inhabited. The Irish islands were considered as a group and all were included in the survey.
14	Italy	Sicily	Italy's principal islands are Sicily and Sardinia, the two largest islands in the Mediterranean. These islands accounted for 11 percent of Italy's population in 2002. Both of these islands were selected for this study. Besides these large islands, Italy also contains a number of smaller archipelagos: the Tuscan archipelago, the Ponziane Islands off Lazio, the Gulf of Naples islands, the Tremiti archipelago in the Adriatic, and the smaller islands surrounding Sicily and Sardinia. For this study the smaller Tuscan archipelago and the remote island of Pantelleria off southern Sicily were selected, in order to address both issues of smaller archipelagos and those of remote islands in the Mediterranean.
15		Pantelleria	
16		Tuscan Archipelago	
17		Sardinia	
18	Malta	Malta, Gozo and Comino	The island state of Malta with its sister islands of Gozo and Comino were selected.
19	Netherlands	Western Frisian	The seven West Frisian Islands of the Netherlands were selected.

20	Norway	Svalbard	Norway consists of a large number of islands. However the 62,700km^2 Svalbard archipelago, Europe's northernmost territory, is relatively remote from the mainland, and has been selected here as an example of an Artic archipelago. It lies only 1,000km from the North Pole and two thirds of its land area is covered by glaciers.
21	Portugal	Azores	Portugal contains two island archipelagos: the Azores (9 islands, 1,527 km^2) and Madeira (4 islands, 797 km^2). Both of these are autonomous regions with their own Parliamentary assemblies. Of these archipelagos the larger archipelago of the Azores was selected for the survey.
22	Spain	Balearics	Spain's principal islands lie within the Balearic and Canary archipelagos, both of which were selected. Minor islands off Galicia in the North and Alicante in the South were not included.
23		Canaries	
24	Sweden	Gotland	Sweden has numerous small islands; however Gotland is the largest island with a land area of 57,000 km^2 and a population of 57,000.
25	UK	Guernsey	The UK contains many islands and archipelagos, from the Channel Islands (not part of the EU) and Isles of Sicily, the Isle of Wight in the South, the Isle of Man in the Irish Sea, the numerous Scottish archipelagos and islands including the Shetland and Orkney Islands to the Northeast and the Outer Hebrides. To cover both northern and southern British Isles, Guernsey, and the Outer Hebrides, Orkney and Shetland Islands were included.
26		Hebrides, Outer	
27		Orkney	
28		Shetland	

Identification of Sustainability Indicators

In order to discuss the sustainability issues identified, indicators of EU island sustainability were developed and quantified as far as possible. From the list of indicators[12] already developed within the SENSOR project and based on the Impact Assessment Guidelines and from the indicators listed during the expert interviews, a list of 143 indicators was prepared. After a further assessment on the basis of specific criteria and a weighting exercise 16 indicators, that well described the sustainability issues identified, were selected. A spatial dataset based on these sustainability indicators was eventually developed.

Clustering

Cluster analysis was performed to identify relatively homogenous groups of islands or archipelagos within the set of 28 study islands, based on those sustainability indicators chosen through this survey that could be computed for a range of islands, ensuring that all three pillars of sustainability were addressed. Cluster analysis was performed by K-means and correlation analysis between the input variables was performed to exclude those less important variables that were intercorrelated with key indicators. Through this process a number of the variables were removed due to intercorrelations.

Spatial statistical techniques were employed using CrimeStat's[13] KMeans Clustering procedure that provides a great deal of control for the user and was used to identify 'hot spots' based on each variable. K-Means was deemed the best procedure for partitioning the variables under study into a small number of clusters. In this

[12] Draft indicator list produced by Module 2 of the SENSOR Project and available on: www.sensor-ip.org.

[13] Levine N.L., (2002), CrimeStat: A Spatial Statistics Program for the Analysis of Crime Incident Locations (v 2.0). Ned Levine & Associates, Houston, TX, and the National Institute of Justice, Washington, DC. CrimeStat is increasingly being used in the interpretation of social, environmental and physical disciplines as its technique is based on point analysis and facilitates spatial analytical research.

technique, each group is spatially assigned the best positioning of the K centers where each point is positioned to the center that is nearest where all points are assigned to clusters. This procedure enables the visualization of those data points which are assigned to the nearest cluster.

4. Results and Discussion

This research has identified the position and extent of continental European (EU25+3) islands. A total of 5,116 European islands, occupying a land area of 328,021 km^2 or 6.76% of the area of EU25+3 were identified. In terms of all the countries of Europe (including those not in the EU), islands occupy 3.31% of the land area. The identification of key sustainability issues, together with the construction of a dataset inclusive of the relevant sustainability indicators, shows that European islands face similar challenges.

As has been widely documented (Planistat, 2002; Eurisles, 1997; 2002), European islands display a wide range of characteristics with respect to certain key indicators such as size, population, wealth and climate. However, this does not detract from the overall argument that islands exhibit particular common challenges related to problems of size, remoteness, status and isolation that deserve specific policy attention, including creating or extending policy related instruments, at EU and other scales. The 12 major issues that emerged from the 26 expert interviews are listed in Table 2 below. Issues that received less than six mentions are also listed in the table.

Table 2: Sustainability Issues in European Islands, with Number of Mentions

Key Issues	
Issues with number of mentions	**Islands where issues were mentioned**
1. Extreme population dynamics (19)	Guernsey, Balearic, Aegean, Ionian, Svalbard, Corsica, Finnish Archipelago, Irish islands, Outer Hebredies, Bornholm.
2. Low potential for economic diversification (16)	Guernsey, Shetland, Orkney, Azores, Aegean, Ionian, North Aegean, Tuscan archipelago, Pantelleria, West Frisian, Canary.
3. Negative impact of land development (16)	Saaremaa, Aland, Balearic Aegean, Cyprus, Tuscan archipelago, Pantelleria, Gotland, Malta, Outer Hebrides, East Frisian, Canary.
4. Marine Water Quality (13)	Iceland, Aland, Svalbard, Finnish, Tuscan archipelago, Finnish archipelago, Irish islands, Gotland, Sicily, Bornholm.
5. Water Status (13)	Aegean, Finnish archipelago, Tuscan archipelago, Pantelleria, Gotland, Malta, Sicily, Canary, Sardinia.
6. Waste management challenges due to small size and remoteness (12)	Guernsey, Shetland, Azores, Aegean, Cyprus, Corsica, Tuscan archipelago, Irish islands, Gotland, Malta, Sicily, Sardinia.
7. Tourism pressures (12)	Balearic, Ionian, Finnish archipelago, Pantelleria, Gotland, Malta, Sicily, East Frisians, West Frisians, Canaries, Sardinia
8. Insularity and peripherality (10)	Azores, Cyprus, Pantelleria, Malta, Bornholm, Canaries, Sardinia.
9. Declining agriculture and fisheries (9)	Orkney, Cyprus, Corsica, Finnish archipelago, Irish islands, Bornholm.

10. Degradation of natural resources and loss of biodiversity (8)	Saaremaa, Iceland, Svalbard, Irish, Pantelleria, Malta, Sardinia.
11. High cost and impact of energy use (7)	Shetland, Balearic, Irish islands, Gotland, Malta, Sicily.
12. Low levels of education and training (6)	Azores, Aegean, Malta.
Other issues:	
Climate change (4); Unemployment (3); Transport (2); Air pollution (2); Poor infrastructure (2); Coastal protection (2); Slow economic growth (1); High exposure to influences from outside (1); High dependency on imports (1); Small size (1); Extremeness (islands tend to experience extremes of many issues such as size, remoteness, climate, mono-sector economies, population density, etc) (1); How to operate and manage globalization (1); Social exclusion (1); Sustainability of social budget (1); High level of violence (1); Social polarization (1); Alcohol and drug abuse (1); Poor state of cultural heritage (1); Fires in forests (1); Cleaning up and rehabilitation of industrial or quarrying sites (1); Security of Oil Tankers (1); Housing in immigrant communities (1); Pollution due to industrial sites (1); Noise pollution (1); Intraregional imbalances between islands (1); Lack of understanding from the National and Regional Governments of the importance of sustainability issues (1); Misunderstanding in the population regarding tourism's high impact on environment (1).	

Impact Assessment Guidelines and Sustainability Issues in EU Islands

This section addresses the relevance of the EU impact issues contained in the Impact Assessment Guidelines (CEC, 2005) in relation to European islands. Table 3 (a-c) places each of the key island sustainability issues in the context of the EU impact issues, indicating that these are indeed general enough to cover all island issues. However, it also shows that some of the key island issues such as peripherality and competitiveness *vis-à-vis* the European mainland are only indirectly addressed. In terms of assessing the impacts of policy on sustainable island development, this is an important finding, suggesting that another impact issue on insularity and peripherality could be added to the list of impact issues.

Table 3a: Comparison of Key Sustainability Issues for Islands with EU Impact Issues (Economic)

Impact issue	**Key Sustainability Issue for EU Islands**
ECO1: Competitiveness, trade and investment flows	Extreme population dynamics, Low potential for economic diversification
ECO2: Competition in the internal market	Extreme population dynamics, Low potential for economic diversification, Declining agriculture and fisheries
ECO3: Operating costs and conduct of business	Extreme population dynamics, Low potential for economic diversification
ECO4: Administrative costs on businesses	Extreme population dynamics, Low potential for economic diversification, Waste management challenges due to small size and remoteness
ECO5: Property rights	N/A
ECO6: Innovation and research	Low levels of education and training
ECO7: Consumers and households	High costs and Impacts of Energy use
ECO8: Specific regions or sectors	Insularity and peripherality
ECO9: Third countries and international relations	
ECO10: Public authorities	Waste management challenges due to small size and remoteness, High costs and impacts of energy use
ECO11: The macroeconomic environment	Low potential for economic diversification
OTHER economic issues	N/A

Table 3b: Comparison of Key Sustainability Issues for Islands with EU Impact Issues (Social)

Impact issue	Key Sustainability Issue for EU Islands
SOC1: Employment and labour markets	Tourism pressures
SOC2: Standards and rights related to job quality	Tourism pressures
SOC3: Social inclusion and protection of particular groups	High costs and impacts of energy use
SOC4: Equality of treatment and opportunities, non – discrimination	N/A
SOC5: Private and family life, personal data	Tourism pressures
SOC6: Governance, participation, good administration, access to justice, media and ethics	Insularity and peripherality
SOC7: Public health and safety	Insularity and peripherality, Tourism pressures
SOC8: Crime terrorism and Security	Tourism pressures
SOC9: Access to and effects on social protection, health and educational systems	Insularity and peripherality
OTHER social issues	N/A

Table 3c: Comparison of Key Sustainability Issues for Islands with EU Impact Issues (Environmental)

Impact issue	Key Sustainability Issue for EU Islands
ENV1: Air quality	Negative impact of land development, High costs and impacts of energy use
ENV2: Water quality and resources	Tourism pressures
ENV3: Soil quality or resources	Declining agriculture and fisheries; Degradation of natural resources and loss of biodiversity; Negative impact of land development
ENV4: The Climate	Marine water quality, High costs and impacts of energy use
ENV5: Renewable or non-renewable resources	Declining agriculture and fisheries; Degradation of natural resources and loss of biodiversity, Marine water quality, Negative impact of land development, High costs and impacts of energy use
ENV6: Biodiversity, flora, fauna and landscapes	Degradation of natural resources and loss of biodiversity, Negative impact of land development, Marine water quality
ENV7: Land use	Negative impact of land development, Tourism pressures, Waste management challenges due to small size and remoteness, High costs and impacts of energy use
ENV8: Waste production / generation / recycling	Waste management challenges due to small size and remoteness, Negative impact of land development Tourism pressures
ENV9: The likelihood or scale of environmental risks	Marine water quality, High costs and impacts of energy use
ENV10: Mobility (transport modes) and the use of energy	Insularity and peripherality, High costs and impacts of energy use
ENV11: The environmental consequences of firms´ activities	Tourism pressures, Waste management challenges due to small size and remoteness, High costs and impacts of energy use,
ENV12: Animal and plant health, food and feed safety	Marine water quality.
OTHER environmental issues	Declining agriculture and fisheries

Sustainability Indicators for EU Islands

In order to be able to discuss island sustainability issues in more depth and comparatively, a set of sustainability indicators has been developed. This list was based on indicators suggested by interviewees and indicators proposed by the SENSOR project to correspond with the EU impact issues as defined in its Impact Assessment Guidelines (CEC, 2005). Table 4 presents the final list of indicators for island sustainable development. Although data availability in some cases was relatively poor, two indicators ('% land covered by Natura 2000 sites' and 'Compliance with Bathing Water Directive'), were left in the set as they related to highly significant issues which could not be better covered by another indicator. In two cases where data was difficult to access, surrogate indicators were used, although they addressed the issue less well.

Table 4: Final list of 16 Sustainable Development Indicators for EU25+5 Islands

Ind. No	Indicator Name	Proxy	Issue No
1	Population density		1
2	% of population above 65 years		1
3	Employment by sector		2
4	Unemployment rate		2
5	GDP per capita (EURO/National currency)		2
6	% land built up	% urban area of total (CORINE)	3
7	% Compliance with Bathing Water Directive		4
8	Water abstraction rate (ground and surface)	Water abstraction rate for agriculture (IRENA)	5
9	Precipitation rate		5
10	Municipal waste generation per capita		6
11	Daily tourist population per square kilometer		7
12	Virtual distance from centre of Europe (Eurisles study)		8
13	% agricultural land use change		9
14	% of land covered by Natura 2000 sites		10
15	Energy consumption per resident population		11
16	% of researchers in relation to active population		12

The indicators were then quantified with data being collected primarily from international databases.[14] In some cases coverage was thin, such as when data was only available at NUTS-2 level and therefore, had to be supplemented by data from island statistical publications. This was however avoided as much as possible, in order to avoid comparability issues. The spatial coverage of certain datasets is therefore not wide. Full coverage was only obtained for data available in raster format, such as the Integrated Pollution Prevention and Control (IPPC) precipitation data and the European Environmental Agency (EEA) and IRENA[15] water abstraction for agriculture data, where values could be collected for small geographical regions. Comparable datasets for indicator 14 (Table 4) on Natura 2000 sites could not be located at the required scale. However, this will be eventually available when these sites are approved at EU level. A major finding of this survey, therefore, which echoes the concerns raised in Planistat (2002) and Eurisles (2002), deals with the need to develop comparable datasets on sustainability issues, which may be used to inform policy decisions at EU level regarding sustainable development in island regions.

[14] Such as those of Eurostat and the European Environment Agency.
[15] Indicator Reporting on the Integration of Environmental Concerns into Agriculture Policy (IRENA).

Clustering

Once the island sustainability indicators had been quantified, a clustering exercise was carried out to identify areas across EU25+3 of greater concern. As noted above, correlation analysis was carried on the 15 quantified variables, in order to ensure their mutual independence. Out of the 15 variables, it resulted that six (6) variables were independent, and the complement could not therefore be considered for inclusion in the list of clustering variables. First, all five variables relating to 'population above 65 years', GDP, sectoral employment ('% services in total employment'), research and precipitation, were removed since they all correlated positively with unemployment rate. Next, modest positive correlations were found between '% Urban land use of total' and 'population density', 'Energy consumption per resident population' and 'Municipal waste generation per capita'. Finally, there was a strong negative correlation between '% Agricultural land use change' and 'Unemployment rate' and a slight negative correlation between bathing water quality and energy consumption.

The following independent variables were therefore used in the cluster analysis: population density; unemployment rate; water abstraction rate; daily tourist population per sq. km; energy consumption per capita; and, virtual distance from the centre of Europe (symbolised by Maastricht).

Based on the geographic separation between the North and South island groups, the procedure was expected to produce different clusters for these regions, with the production of multiple clusters in both areas. This was not the case, however, since only two clusters emerged strongly, those designated as representing Northern and Southern Europe. Smaller clusters within each were not produced even when a minimum number of four clusters were forced. This is due to the relatively small differentiation between the islands in each group, such that no higher-level clustering is possible. The results show that spatial clustering procedures such as K-Means analysis serve to highlight potential hotspots that deserve further study.

Despite the limitations of clustering on such small datasets, which may be skewed in favour of the more politically prominent islands of Southern Europe, which have higher NUTS classifications, and thus better data availability, and on the use of a limited number of six sustainability indicators out of the 16 indicators proposed, two clusters, with a stronger one in the South, do nevertheless emerge.

These findings highlight the usefulness of the island state of Malta as a Case Study of European island: it lies at the centre of the Southern Islands cluster, which was characterised by higher rates of clustering for all six variables. The islands of Malta will also be used as an island Case Study to test the SENSOR impact assessment tool developed by the consortium.

Sustainability issues in EU25+5 islands

This section examines each key issue raised by interviewees in turn, drawing on the sustainable development indicators developed and quantified in this survey to better understand their scale and severity.

Extreme Population Dynamics

Extreme population dynamics was a recurrent subject raised during the expert interviews. Population, in general, is an issue that is invariably linked with the sense of belonging to a community and to a territory. Population density may vary substantially among islands and may relate to both concerns over high and low densities. Low density is often associated with depopulation, out-migration and the consequent problems of brain drain, aging population and concerns about sustainability of the social budget and of the economy (this was the case in Corsica, the Finnish Archipelago, the Irish Islands, Outer Hebrides, Bornholm, Southern and Northern Aegean, Guernsey). The issues associated with an ageing population were often mentioned by respondents.

Maintaining the population, often small, with an adequate presence (and quality) of services is also of a considerable concern, given the fact that citizens might be forced to travel significant distances to receive, for instances, medical services or enjoy educational facilities. This last phenomenon is particularly evident in the Southern and Northern Aegean Islands, and in the Ionian and Irish Islands. Many islands, on the other

hand, experience very high levels of population density, manifesting severe environment capacity stresses as well as high levels of social concern related to issues such as land use and immigration.

The Maltese Islands have the highest population density with 1,263 persons per km^2, Guernsey with 807 persons per km^2, the Canary Islands with 248 persons per km^2, Sicily registering 196 persons per km^2 and the Balearic Islands with 184 persons per km^2, compared to a EU average of 117. Malta is the most densely populated country in Europe and the third densest in the world. In this context a special reference has to be made to the growing influence, not only numerical, of immigrant communities in European islands. This phenomenon is not exclusively European and does not influence only islands, but the implications for islands are perceived, and objectively appear, more serious. Small densely populated islands subjected to high immigration pressures in immigration often experience a dramatic change in the structure of their populations, posing social challenges with respect to cultural and religious identities and as well as logistical and financial ones.

In many islands, as in many European countries, the phenomenon of gentrification was noted, where the process of physical renovation of declining neighborhoods that brings an increase in property values, favors an influx of wealthier residents who, though out-pricing them, displace the island neighbourhood's original inhabitants from their home locality.

Low Potential for Economic Diversification

Respondents recognised the difficulty of achieving sustainable economic performance within the context of a fragile reliance on only one driving economic sector. This issue is characterised by the dominance of the oil industry in the Orkneys, financial services in Guernsey and tourism in most of the Mediterranean islands. Interestingly, policy communities seem to be aware of the potential dangers caused by the lack of diversification in the economy and sustainable economic and land-use planning was one of the major policy solutions recommended during the interviews.

Negative Impact of Land Development

Land use and tendencies towards excessive development are major concerns in many islands. Urbanization rates across EU islands are varied and generally higher in islands experiencing stronger tourist pressure. Pressure from developers in order to either boost tourism activities or enlarge the property market occurs across islands from the Baltic (Saaremaa) and the Mediterranean (the Balearics, Pantelleria and Malta) to the North Sea (the East Frisians) and the Atlantic Ocean (the Outer Hebrides). Coupled with this there is the recognition that the form of land-use planning as currently practiced may not be sufficient to address the proper management of present and future development. Strictly related to this there is also a concern related to extensive quarrying activity, where the Aegean Islands, Gotland and Malta registered particular concern. The important role of the construction sector in islands' economies, is also a concern, particularly in relation to its impacts on the environment in the Canaries, the Aegean Islands, the Balearics and Malta.

Marine Water Quality

Sea water quality emerged as an important issue, due to the fact that inshore marine waters perform vital functions and services for islands. This concern was not of an ecological nature only, since the majority of the islands sea is also associated with tourism. Maintaining an adequate level of marine protection is therefore also essential to preserve a high degree of competitiveness and consequently acceptable levels of employment. Sea pollution, sewage discharges, the extensive presence of fish farms, and maritime issues were all points raised during the interviews. The international aspects of the protection of marine areas were also highlighted, together with an extended concern associated with potential damages caused by climate change and sea level rise. This is more evident in islands like Iceland and the Svalbard, where ice melt and transboundary pollution considerably affect the environment and the economy of these islands.

European legislation, particularly the Bathing Water Directive and the Water Framework Directive, plays an important role in the protection of the sea and it is generally agreed that the directives and regulations during last decades have brought positive improvements, although results in the more remote islands are not very visible. Considerable difficulty was registered in gathering information on marine water quality, particularly

because thresholds and parameters are often not tailored to islands' sizes and characteristics. With respect to the compliance with the Bathing Water Directive in 2005, almost all the islands comply with the requirements.

Water Status

European island experts identified water scarcity and sustainable use of this important resource as crucial concerns. There is wide recognition that water plays a crucial role in environmental, social and economic aspects of islands' communities. In addition, contamination of ground water from polluting agricultural activities was also an issue (particularly in the Canary Islands, Sardinia, Malta and Gotland), together with illegal and uncontrolled water abstraction. Abstraction rates for agriculture indicate that water pressures are greater in southern Europe, while precipitation rates in the southern islands are low, as might be expected. Given these considerations, the need for a better management and regulation of water emerged as one of the most recurrent concerns.

Waste Management Challenges Due to Small Size and Remoteness

The problems associated with waste management invariably arose for most of the islands studied. Higher levels of consumption and consequently larger amounts of waste produced, in relation to land, was a common theme. Limited land area for storage of waste, and environmental and social problems associated with the location of landfills were major concerns within island communities. The challenges related to waste recycling in small islands were also raised by numerous respondents. The waste to energy issue was also raised on a number of occasions. The difficulty with collecting large quantities of waste to recycle (due to limited land and small catchment areas for waste collection), does not allow small and medium size islands to benefit from economies of scale.

The costs associated with the construction and maintenance of waste recycling plants and the high costs of transport of final products (shipping and air freight), together with markets too small to absorb the amount of products which make this process worth investing in, constrain recycling activities and the development of alternative environmental options.

Tourism Pressures

Many interviewees (12) expressed major concerns for the pressure on the islands represented by tourism. Although tourism represents an important part of islands' income, the negative consequences represented by high consumption of energy, water and land for the creation of adequate infrastructures and facilities were often raised. The pressure represented by the presence of tourists in the islands is further aggravated by population density. This is particularly true for highly densely populated islands and for islands that receive a high number of tourists throughout the year. Countries including Malta, the Canary Islands and the Balearics, which already have a relatively high population density experience an even higher density when the tourist population is also considered.

In some islands the short tourist season presents an additional pressure on the territory and its resources. Coupled with this there is the necessity to manage tourism activities better and to set strategies to concretely incorporate sustainability concerns within tourism planning.

Insularity and Peripherality

Due to their insularity and peripherality, islands have certain characteristics that distinguish them from continental regions. From an economic point of view, growth is strongly influenced by the limitations of natural resources and the dependency on imports. This significantly affects the efficiency of the local economy, which leads to greater vulnerability.

From an ecological perspective the isolation from continental areas and their relatively small size determine a greater diversity in their ecosystems. On the other hand, these conditions create a scenario where the impacts are both more intense and more noticeable due to the fact that the capacity for auto-regeneration in insular systems is far weaker.

Higher costs of transport and greater difficulties to reach the islands, compared with the mainland, are also of a great concern among island communities, and this concern has reached the policy level as reflected in the 2002 EU Treaty.

Declining Agriculture and Fisheries

Agricultural and fisheries activities have always played an important role in European islands. Both the physical presence of the related facilities and the culture and traditions associated with these activities remain important for island communities. However, agriculture and fisheries are experiencing either a decline in productivity, with less production and lower levels of employment, or a radical change from extensive to intensive production, changing the structure of the activity, often with the creation of negative environmental externalities. Within this context the decline not only has a negative effect on the economy but has also driven environmental change in the form of land abandonment, landscape degradation and loss of fish stocks and biodiversity, including agro-biodiversity.

Degradation of Natural Resources and Loss of Biodiversity

Loss of biodiversity and the need for improved nature protection are very important concerns that have been highlighted by the interviewees and the existing literature on European islands (Tyndall 2005, Eurisle 2002). The potential loss of the very specific and unique biodiversity of islands is one of the most frequent issues mentioned with the main concerns arising from Saaremaa, Malta, Svalbard and Pantelleria. Protection of nature against development (wind farms, major development projects, industrial plants, etc.) is also a common preoccupation in islands, particularly in the Shetlands and in the West Frisians, where plans to develop wind farms have raised several questions regarding impact on landscape and disturbance of local fauna. Indeed, the fear of losing the islands' natural assets because of unsustainable physical land development is a major concern. Islands' dependency on natural resources and the potential dangers that this process implies, were often noted.

The expansion of aquaculture arose as a common concern, together with its consequences on quality of the sea and food safety. In addition to this there is a certain apprehension about how to ensure that traditional fishing and agricultural practices remain viable, both economically and socially.

High Cost and Impact of Energy Use

Energy-related issues represent a matter of common concern in European islands, with excessive consumption, collectively or by sectors, recognized as a serious problem. In certain instances this is particularly true as for those islands that rely on fossil fuels and do not have adequate facilities to store oil. The dependency on fossil fuels is critical, both as a strategic issue and because of the negative implications for the environment and health.

The necessity to switch to alternative energy provision, which would be less dependent on foreign suppliers and less polluting, was recognized as a priority for European islands. On the other hand, many of the islands identified are currently facing tensions between landscape concerns and the need to install large scale alternative energy technology.

Although the need to diversify the production of energy was recognized as extremely important and generally found the support of interviewees, the impact of these large plants on the landscape remains of great concern in many island communities.

Low Levels of Education and Training

Issues related to adequate levels of education and training also emerged as matters of concern. Lack of quality in human resources, understood in terms of the necessity to search outside the islands' work forces to fill jobs and positions, was of concern in many islands. The phenomenon of travel to learn was also raised as one of the consequences of lack of adequate academic facilities and/or opportunities. Coupled with this there is the problem of 'brain drain', where a consistent segment of the skilled and educated workforce leaves the islands to take up work opportunities that would have not been available in the islands. In fact, the

percentage of researchers living and operating in European islands is often low. There is an exception in the case of Iceland, which has consistently invested in education and has a level of research that significantly exceeds the EU average (Baldacchino and Milne, 2000).

Island Issues in EU Policy following 2004

As part of this research, the authors have also assessed whether the accession of island states to the EU has had a bearing on the way island issues have been addressed within EU policy-making. Besides the obvious example of the way islands have been included as sensitive areas within policy research such as the present SENSOR project, policy outcomes have also been examined. It emerges that following the accession in 2004 of Malta and Cyprus, two small island states, the specific concerns faced by islands have progressively gained more importance within the EU policy arena. In many instances the particular characteristics of islands have been incorporated within EU legislation. This is the case for Directive 2008/101, which deals with the inclusion of aviation activities in the scheme for greenhouse gas emission allowance trading within the Community. In this specific case, following pressures during the negotiations from the Maltese counterpart, an article f was included, referring to the need for the Commission to review by 2014 the functioning of the directive in relation to aviation activities. This article established that this review exercise would be undertaken by giving consideration to '*the impact of the Community scheme on the structural dependency on aviation transport of islands, landlocked regions, peripheral regions and the outermost regions of the Community*'.

5. Conclusions

The European islands occupy a land area of 0.3 million km^2 or 6.76% of the area of EU25+3. In terms of all the countries of Europe (including those not in the EU), islands occupy 3.31% of the land area. The identification of key sustainability issues, together with the construction of a dataset inclusive of the relevant sustainability indicators, shows that European islands face similar challenges.

When compared to the EU impact issues, it results that the latter are indeed general enough to cover all issues, however that some of the key island issues such as peripherality and competitiveness *vis-à-vis* the European mainland are only indirectly addressed. In terms of the adequacy of assessing the sustainability impacts of EU policy on island regions via these impact issues, this is an important finding, suggesting that another impact issue on remoteness and peripherality could be added to the list.

The definition of Islands contained in the Eurostat publication '*Portrait of Islands'*, which does exclude islands that are host to national capitals, is currently being used by the European Commission as the main reference for impact assessment and policy decisions that affect Islands. Given the cross cutting implications of the use of this definition, particularly that it effectively excludes Malta and Cyprus, and hence excludes the possibility of enjoying the due consideration given to islands, it is suggested to review such definition.

Research into policy-designing and policy-making within EU institutions, showed that EU Island States, particularly Malta, attempted to incorporate Islands' sustainable concerns in EU's legislation. In selected instances, as for Directive 2008/101, they succeeded in incorporating island concerns into EU legislation. In this regard, it may be argued that with the accession to the EU of Malta and Cyprus, island' issues have acquired more relevance. However, further research should be undertaken in order to identify all the areas where island sustainability issues are not being sufficiently taken into account in EU policy-making and policy design.

This study has faced a major constraint relating to the lack of statistical data on sustainability issues for European islands, mainly due to the fact that they are often classified at NUTS-1 or 2. This constraint is complicated by lack of harmonization of data for the different islands. A major finding of this survey, therefore, which strengthens islands' issues also raised in Planistat (2002), concerns the need to develop comparable datasets on these issues, which may be used to inform policy decisions at EU level regarding the sustainable development of island regions. It is hoped that this survey will raise the profile of island sustainability in Europe, which will in turn influence the EU policy-making process, and thus the progress of sustainable development in European islands.

A growing number of studies have contributed towards greater understanding of sustainability issues in islands, but this remains a relatively new area of research in the European context. This places the present research in an arena of innovation where island sustainability concepts need to be adapted to a European context, and studies from political economy need to be adapted to take sustainability into account.

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